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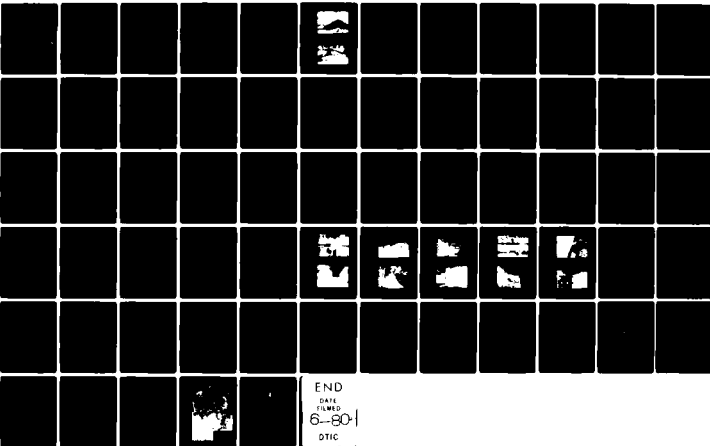
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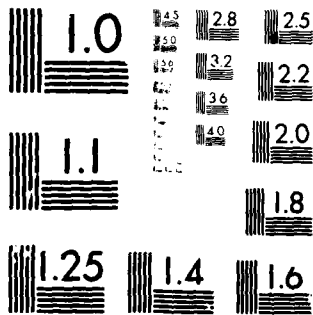
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OHIO RIVER BASIN  
BRANCH OF DUTCH FORK, WASHINGTON COUNTY  
PENNSYLVANIA

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CLAYSVILLE No. 1 DAM

NDI No. PA 00491  
PennDER No. 63-35

LEVEL II

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

MICHAEL BAKER, JR., INC.

DACW 31-80-C-0025



prepared for

DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

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March 1980

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OHIO RIVER BASIN

CLAYSVILLE No. 1 DAM  
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI No. PA 00491  
PennDER No. 63-35

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM.

Clayville

Number 1 Dam, NDI Number PA-00491,  
PennDER Number 63-35, Ohio River  
Basin, Branch of Dutch Fork, Washington  
County, Commonwealth of Pennsylvania. Phase I  
Inspection Report,

DTIC  
ELECTE

JUN 6 1990

Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.  
Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

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⑩ John A. Dziubek

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In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

|               |          |         |             |                  |    |              |              |             |          |
|---------------|----------|---------|-------------|------------------|----|--------------|--------------|-------------|----------|
| Accession For | DATE     | DDC TAB | Unannounced | Justification    | by | Distribution | Availability | Reviewed/Or | Special  |
|               | 11/11/61 |         |             | <i>See index</i> |    |              |              |             | <i>A</i> |

PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Claysville No. 1 Dam, Washington County, Pennsylvania  
NDI No. PA 00491, PennDER No. 63-35  
Tributary of Dutch Fork of Buffalo Creek  
Inspected 5 December 1979

ASSESSMENT OF  
GENERAL CONDITIONS

Claysville No. 1 Dam is classified as a "High" hazard - "Small" size dam. The dam and reservoir, owned by the Claysville-Donnegal Municipal Water Authority, are used for water supply. The dam was found to be in fair overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass approximately 35 percent of the Probable Maximum Flood (PMF) before overtopping will occur. A spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the PMF is required for Claysville No. 1 Dam. The PMF was chosen because an elementary school is located within the floodplain 900 feet downstream from the dam. Because the duration and depth of overtopping under the 1/2 PMF (2.83 hours and 0.59 foot, respectively) did not meet the limiting criteria for failure of the dam (2 hours and 1.0 foot), the spillway is assessed as "inadequate," but not "seriously inadequate." It is recommended that the owner immediately initiate an engineering study to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 and 2 below should be completed by a qualified professional engineer experienced in the design of hydraulic and appurtenant structures for earth dams.

- 1) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.
- 2) The condition and operability of the sluice gates and valves should be evaluated and the necessary maintenance performed. The operability of these components should be checked at least once a year in the future.

CLAYSVILLE No. 1 DAM

- 3) Repair the areas of spalled and deteriorated concrete on the spillway training walls and end sill of the stilling pool.
- 4) Fill the animal/rodent burrows in the embankment.
- 5) Fill the low areas on both the right and left sides of the spillway structure.
- 6) Remove the I-beams from the downstream channel.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented.

Submitted by:

MICHAEL BAKER, JR., INC.



John A. Dziubek  
John A. Dziubek, P.E.  
Engineering Manager-Geotechnical

Date: 26 March 1980

Approved by:

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS

James W. Peck  
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

Date: 29 April 1980

## CLAYSVILLE No. 1 DAM



Overall View of Dam from the Left Abutment



Overall View of Dam from the Right Abutment



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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
CLAYSVILLE No. 1 DAM  
NDI No. PA 00491, PennDER No. 63-35

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authorization - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - The Claysville No. 1 Dam is an earthfill dam approximately 31.5 feet high and 234 feet long. The crest width is 10 feet, the downstream slope is 2H:1V (Horizontal to Vertical), and the upstream slope is 2.5H:1V with riprap protection designed to cover the entire upstream slope. The embankment has two clay puddle cut-off trenches. The first one is near the toe of the upstream embankment and the second is at the centerline of the dam. Both clay puddle cut-off trenches are shown as six feet wide and the depth of the trench was designed to extend to impervious material. The actual depth is not known.

The spillway is located at the right abutment and consists of a broad crested weir and chute channel. The crest is at Elevation 1158.5 feet Mean Sea Level (M.S.L.) or 1.5 feet higher than the original design. The crest length perpendicular to flow is 12 feet. The rectangular chute channel partially curves toward the center of the dam in plan view and narrows to 8 feet wide from the original 12 foot width at the crest. A stilling pool structure is located at the toe of the embankment before the discharge enters the original streambed downstream from the dam.

The outlet works consist of a sluice gate chamber at the toe of the upstream slope and a 12 inch

cast-iron water supply pipe through the embankment. There are three intakes at Elevations 1152.5, 1143, and 1133.2 feet M.S.L. which can be closed by three 8 inch sluice gates. A 12 inch gate valve, located in the sluice gate chamber, provides closure for the 12 inch cast-iron pipe that passes through the embankment. At the downstream slope a "tee" is located on the 12 inch pipe. One pipe supplies water to the filter building and the other discharges into the stilling basin. The second pipe can be used for emergency drawdown by opening the valve at the downstream toe.

- b. Location - Claysville No. 1 Dam is located 1000 feet upstream of Main Street (U.S. Route 40) in the Borough of Claysville, Washington County, Pennsylvania. The coordinates of the dam are N 40° 7.1', W 80° 25.0'. The dam can be located on USGS 7.5 minute topographic quadrangle, Claysville, Pennsylvania.
- c. Size Classification - The maximum height of the dam is 31.5 feet. The reservoir volume to the top of dam (Elevation 1162.0 feet M.S.L.) is 47 acre-feet. The dam is therefore in the "Small" size category.
- d. Hazard Classification - In the event of failure of Claysville No. 1 Dam, it is likely that more than a few lives would be lost and economic losses would be excessive. The dam is therefore considered to be in the "High" hazard category.
- e. Ownership - The dam and reservoir are owned by the Claysville-Donnegal Municipal Water Authority, P.O. Box 467, Claysville, PA 15323. Mr. Robert W. Walker is the current chairman of the authority.
- f. Purpose of Dam - The dam and reservoir are used for water supply.
- g. Design and Construction History - The dam was designed by Mr. David C. Morrow of Washington, Pennsylvania. The original design drawing (Plate 3) is dated February 1926. The dam was constructed by Thompson Construction Company of Washington, Pennsylvania. Work started immediately after issue of the permit on 28 July 1926 and was complete, except for sluice gates and valves, by 1 November 1926.
- h. Normal Operational Procedures - Normal pool (crest elevation of the spillway weir) is at Elevation 1158.5 feet M.S.L. However, the pool elevation

fluctuates below that elevation because of water usage. The pool at the time of inspection was at Elevation 1158.0 feet M.S.L. or approximately 0.5 foot below the crest of the spillway. The spillway is uncontrolled and the various sluice gates and valves remain open for water supply. The amount of flow through the water supply outlet works is controlled at the filtration plant immediately downstream from the dam. The grass on the crest and downstream slope is well maintained.

### 1.3 PERTINENT DATA

|    |  |         |
|----|--|---------|
| a. | <u>Drainage Area (square miles)</u> -              | 0.28    |
| b. | <u>Discharge at Dam Site (c.f.s.)</u> -            |         |
|    | Maximum Flood -                                    | Unknown |
|    | Spillway Capacity                                  |         |
|    | (at Pool El. 1162.0 ft.) -                         | 243     |
| c. | <u>Elevation<sup>1</sup> (feet above M.S.L.)</u> - |         |
|    | Design Top of Dam -                                | 1162.5  |
|    | Minimum Top of Dam -                               | 1162.0  |
|    | Spillway Crest -                                   | 1158.5  |
|    | Streambed at Toe of Dam -                          | 1130.5  |
|    | Maximum Tailwater of Record -                      | Unknown |
| d. | <u>Reservoir (feet)</u> -                          |         |
|    | Length of Maximum Pool -                           | 1500    |
|    | Length of Normal Pool -                            | 1100    |
| e. | <u>Storage (acre-feet)</u> -                       |         |
|    | Top of Dam (El. 1162.0 ft.) -                      | 47      |
|    | Spillway Crest (El. 1158.5 ft.) -                  | 25      |
| f. | <u>Reservoir Surface (acres)</u> -                 |         |
|    | Maximum Pool (El. 1162.0 ft.) -                    | 7.1     |
|    | Spillway Crest (El. 1158.5 ft.) -                  | 4.9     |

<sup>1</sup>The elevations presented are referenced to the spillway crest El. 1158.5 ft. M.S.L. This elevation is 1.5 feet higher than the original design drawing spillway crest El. 1157.0 ft. M.S.L. The difference is probably due to a modification during the construction of the dam.

g. Dam -

|                                  |   |
|----------------------------------|---|
| Type -                           | Earthfill   |
| Length (feet) -                  | 234   |
| Maximum Height (feet) - Design - | 32.0  |
| Field -                          | 31.5  |
| Top Width (feet) -               | 10  |
| Side Slopes - Upstream -         | 2.5H:1V   |
| Downstream -                     | 2H:1V   |
| Zoning -                         | None  |
| Impervious Core -                | Homogeneous embankment  |
| Cut-off -                        | Two 6 foot wide clay puddle trenches were designed to be installed along the centerline of the dam and at the toe of the upstream slope, respectively. The depth of the trenches as installed is not known. (See Plate 3 for the design details.) |
| Grout Curtain -                  | None  |
| Drains -                         | One 4 inch terra cotta pipe drain was installed along the downstream right abutment spillway training wall. (See Plate 3 for location and details.)   |

h. Diversion and Regulating Tunnel - None

i. Spillway -

Type - Broad crested weir with chute channel  
Crest Length Perpendicular to Flow (feet) - 12  
Crest Elevation (feet M.S.L.) - 1158.5  
Gates - None  
Upstream Channel - Junction of embankment and abutment, earth-lined, and approximately 2 feet deep in front of the weir.  
Chute Channel - Rectangular shaped concrete channel 12 feet wide at the weir, narrowing to 8 feet wide before exiting into the stilling pool. The channel is at a 20 percent slope until 20 feet before the stilling pool where the slope increases to 39 percent.  
Downstream Channel - Original streambed

j. Regulating Outlets - Consists of a 12 inch cast-iron pipe placed on a 12 inch thick concrete cradle. One concrete anti-seep collar is installed near the upstream end of the pipe just downstream of the clay puddle cut-off trench. One gate valve is located on the pipe in the intake tower. Another gate valve at the toe of the downstream slope controls the flow

to the emergency drawdown pipe exiting into the stilling basin. Three intakes, controlled by 8 inch sluice gates, are indicated on the design drawing (Plate 3) at Elevations 1152.5, 1143, and 1133.2 feet.

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

Information reviewed for the preparation of this report included the Pennsylvania Department of Environmental Resources' (PennDER) File 63-35 for the dam and information obtained by interviewing the owner's personnel. This included:

- 1) The design drawings entitled, "Storage Reservoir, Claysville Water Supply, Claysville, Pennsylvania."
- 2) Report on the application of the Borough of Claysville by the Water and Power Resources Board.
- 3) The original permit allowing the Borough of Claysville to construct the dam and reservoir.
- 4) Permit allowing the Borough of Claysville to install flashboard on the crest of the weir to raise the storage capacity by one foot. (Note: No specific dates of limitation in the use of the flashboard is included on the permit. In addition, no limitations as to when the flashboards should be removed in case of a heavy rainfall was on the permit.)
- 5) Various correspondence, memorandums, and inspection reports including the last recorded inspection on 13 September 1961.

### 2.2 CONSTRUCTION

The dam was constructed by the Thompson Construction Company, Washington, Pennsylvania. Construction was started on the dam sometime after 28 July 1926 and was completed by 1 November 1926. No construction progress reports or construction inspection reports were available in the PennDER file.

### 2.3 OPERATION

The owner, the Claysville-Donnegal Municipal Water Authority, is responsible for all operations and maintenance.

## 2.4 EVALUATION

- a. Availability - PennDER File No. 63-35 contains the design drawings, correspondence, memorandums, and inspection reports for Claysville No. 1 Dam.
- b. Adequacy - The information available is adequate for a Phase I Inspection of this dam.
- c. Validity - Observations and measurements performed during the visual inspection indicated a few deviations from the design drawings for this dam. These are:
  - 1) The weir of the spillway is 1.5 feet higher than shown on the drawings.
  - 2) The cut-off wall on the right side of the spillway wall was not installed.
  - 3) The two wing walls at the end of the stilling pool structure were not installed.
  - 4) It appears that the sedimentation basin for the water supply system, as shown on the design drawing, was not constructed.



## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

- a. General - The dam and its appurtenant structures were found to be in fair overall condition at the time of inspection. The visual inspection was performed on 5 December 1979 and no unusual weather conditions were present. Noteworthy deficiencies are described briefly below. The complete visual inspection check list, field sketch, top of dam profile, and typical cross-section are given in Appendix A.
- b. Dam - The embankment has a good, well maintained cover of grass growing on it. No problems were observed in the alignment or stability of the slopes. No erosion or seepage problems were observed during the visual inspection. Two animal burrows were present at Stations 1+33 and 1+49 (the stationing used during the visual inspection is shown on the field sketch in Appendix A) on the downstream slope approximately 10 feet below the crest of the dam. A low spot is present behind the right training wall. Also, the top of dam from the left training wall to approximately Station 2+00 is low.
- c. Appurtenant Structures - The concrete spillway appeared to be in fair overall condition at the time of inspection. Several areas of the training walls have started to deteriorate and are in need of repair. These include the right training wall above the crest elevation of the weir, the top of the left training wall at approximately the toe of the slope (see Photo 10), the end sill of the stilling pool, and other minor miscellaneous spots.

The water level in the intake riser chamber was at the same level as the reservoir; therefore, the interior condition of the riser and mechanical equipment could not be examined. According to the owner's representative, the gates and valves remain open all the time and the amount of water supplied is adjusted at the filtration plant. He does not recall when the gates and valves were last operated. The original design plans indicate three sluice gates and one gate valve with a total of four valve stems; however, only three valve stems were observed with one of those exiting the intake tower through the inspection manhole.

- d. Reservoir Area - No problems were observed in the reservoir area. Reservoir slopes are gently sloping to moderately steep with a cover of grass and trees.
- e. Downstream Channel - The downstream channel has some small (negligible) erosion problems along with some debris in the channel. The water filtration plant is located immediately downstream of the left half of the dam. Several (four) storage facilities are also located immediately downstream of the right half of the dam. Approximately 900 feet downstream is an elementary school and play-yard. Three residential structures are also located in the floodplain before the discharge would pass through a restrictive culvert (approximately 4.5 feet by 6 feet) at U.S. Route 40. An additional estimated 10 structures are located in the floodplain between U.S. Route 40 and a Baltimore and Ohio R.R. embankment and culvert. The amount of the flow that can be discharged by the R.R. culvert is also estimated to be low.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

There are no formal written procedures in the event of impending failure of the dam. At the time of the visual inspection, there were no procedures for the inspection of the dam by the owner's representative. However, the pump house and filter building, located at the downstream toe, allows the owner's representative to make an occasional quick visual inspection of the embankment.

### 4.2 MAINTENANCE OF DAM

The Claysville-Donnegal Municipal Water Authority is responsible for maintenance of the dam. Maintenance of the dam has been performed on an as-needed basis. It is recommended that formal written maintenance procedures be developed and implemented.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

The Claysville-Donnegal Municipal Water Authority is responsible for the maintenance of the operating facilities. Although maintenance of these facilities has been performed at various times in the past, no formal schedule or record of the maintenance is presently in use. It is recommended that operation and preventive maintenance schedules be developed and implemented.

### 4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

At the present time, there is no warning system or evacuation plan in effect in the event of a dam failure.

### 4.5 EVALUATION OF OPERATIONAL ADEQUACY

It is uncertain whether the existing valves and gates are currently operational; they should be evaluated. The owner keeps a boat on the left abutment in case access to the intake tower is required. The maintenance of the embankment is very good.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

- a. Design Data - No hydrologic or hydraulic design calculations are available for Claysville No. 1 Dam.
- b. Experience Data - No information concerning the effects of significant floods on the dam is available.
- c. Visual Observation - There is a low spot on the embankment behind the right training wall at the crest of the dam. The concrete in the spillway discharge channel has begun to deteriorate. No other conditions were observed at the time of the inspection that would indicate that the dam and appurtenant structures could not operate satisfactorily in the event of a flood.
- d. Overtopping Potential - Claysville No. 1 Dam is classified as a "High" hazard - "Small" size dam requiring evaluation for a spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the Probable Maximum Flood (PMF). Since there is a school in the downstream floodplain and many lives could be lost in the event of a dam failure, the PMF was chosen as the SDF. The hydrologic capabilities of the dam, reservoir, and spillway were obtained by routing the PMF through the reservoir with the aid of the U.S. Army Corps of Engineers' Flood Hydrograph Package, HEC-1 DB. The hydrologic characteristics of the drainage basin, specifically, the Snyder's unit hydrograph parameters, were obtained from a regionalized study conducted by the Baltimore District of the U.S. Army Corps of Engineers.

The results of this analysis show that the spillway is capable of passing approximately 35 percent of the PMF without overtopping. During the 1/2 PMF, the dam is overtopped for 2.83 hours by a maximum depth of 0.59 foot. The PMF results in overtopping for 5.83 hours by a maximum depth of 1.14 feet.

- e. Spillway Adequacy - The dam, as outlined in the above analysis, would be overtopped by the PMF and 1/2 PMF. The criteria for spillway adequacy determination requires an estimate of the downstream damage increase due to failure by overtopping during 1/2 PMF conditions. Therefore, the following

conditions were used as the limiting criteria which are likely to cause failure of the dam:

- 1) Depth of overtopping by 1.0 foot or greater.
- 2) Duration of overtopping in excess of 2 hours.

The overtopping analysis of this dam yielded the following values:

- 1) 0.59 foot
- 2) 2.83 hours

Because of the small depth of overtopping (0.59 foot) and the well-maintained grass cover on the downstream slope, dam failure is unlikely to occur during 1/2 PMF conditions; therefore, the spillway is classified as "inadequate" rather than "seriously inadequate," according to the recommended criteria.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - No signs of distress or seepage were observed on the embankment during the visual inspection. The deterioration of the spillway structure concrete noted during the visual inspection does not indicate concern at this time for the continued structural stability of the training walls.
- b. Design and Construction Data - Calculations of structural stability were not available for review. No information concerning the dam foundation materials or conditions are available. It is estimated for this dam, with its history of satisfactory performance of the slopes and the fact that no indications of instability were observed during the field inspection, that further assessments of the stability are not necessary for this Phase I Inspection Report. However, should future inspections observe signs of distress which would affect the structural stability of the embankment, additional evaluations and corrective measures may become necessary.
- c. Operating Records - Nothing in the operational information indicates concern relative to the structural stability of the dam.
- d. Post-Construction Changes - No known changes adversely affecting the structural stability of the dam have been performed.
- e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is not warranted.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT

- a. Safety - Claysville No. 1 Dam was found to be in fair overall condition at the time of inspection. The dam is a "High" hazard - "Small" size dam requiring a spillway capacity in the range of the 1/2 PMF to PMF. The PMF was chosen as the SDF because of a school located in the downstream floodplain and the potential number of lost lives in the event of a dam failure. As presented in Section 5, the spillway and reservoir are capable of passing 35 percent of the PMF without overtopping the dam. During the 1/2 PMF, the depth and duration of overtopping are 0.59 foot and 2.83 hours, respectively. Because a limiting criteria of one foot or greater depth of overtopping and duration in excess of 2 hours was estimated for this dam, it was concluded that a dam failure during the 1/2 PMF is unlikely to occur. Therefore, the spillway is considered to be "inadequate" but not "seriously inadequate."
- b. Adequacy of Information - The information and the observations made during the visual inspection are considered sufficient for this Phase I Inspection Report.
- c. Urgency - The owner should initiate the action discussed in paragraph 7.2 without delay, and immediately initiate the further investigation, as discussed in paragraph 7.1.d.
- d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner of Claysville No. 1 Dam immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

### 7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 and 2 below should be completed by a qualified professional engineer experienced in the design of hydraulic and appurtenant structures for earth dams.

- 1) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.
- 2) The condition and operability of the sluice gates and valves should be evaluated and the necessary maintenance performed. The operability of these components should be checked at least once a year in the future.
- 3) Repair the areas of spalled and deteriorated concrete on the spillway training walls and end sill of the stilling pool.
- 4) Fill the animal/rodent burrows in the embankment.
- 5) Fill the low areas on both the right and left sides of the spillway structure.
- 6) Remove the I-beams from the downstream channel.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented.



**APPENDIX A**

**VISUAL INSPECTION CHECK LIST, FIELD SKETCH,  
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION**

Check List  
Visual Inspection  
Phase 1

Name of Dam Claysville No. 1 Dam County Washington State PA Coordinates Lat. N 40° 7.1'  
NDI # PA 00491 Long. W 80° 25.0'  
PennDER # 63-35  
Date of Inspection 5 December 1979 Weather Cool and sunny Temperature 40° F.

Pool Elevation at Time of Inspection 1158.0 ft.\* M.S.L. Tailwater at Time of Inspection 1129.1 ft.\* M.S.L.

\*All elevations referenced to the spillway crest (El. 1158.5 ft.). Note that the "as built" spillway crest elevation is 1.5 ft. higher than the design drawing Elevation of 1157.0 ft.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski  
Jeffrey S. Maze  
N.K. Chakravorti

PennDER:

Mr. Larry Busack

Field Review (18 March 1980)

John A. Dziubek  
James G. Ulinski

James G. Ulinski Recorder

A-2

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: CLAYSVILLE No. 1 DAM

NDI # PA 00491

| VISUAL EXAMINATION OF                            | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|--------------|----------------------------|
| LEAKAGE  |              |                            |
| STRUCTURE TO<br>ABUTMENT/EMBANKMENT<br>JUNCTIONS |              |                            |
| DRAINS   |              |                            |
| WATER PASSAGES                                   |              |                            |
| FOUNDATION                                       |              |                            |

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: CLAYSVILLE No. 1 DAM

NDI # PA 00491

| VISUAL EXAMINATION OF                | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--------------------------------------|--------------|----------------------------|
| SURFACE CRACKS<br>CONCRETE SURFACES  |              |                            |
| STRUCTURAL CRACKING                  |              |                            |
| VERTICAL AND HORIZONTAL<br>ALIGNMENT |              |                            |
| MONOLITH JOINTS                      |              |                            |
| CONSTRUCTION JOINTS                  |              |                            |

EMBANKMENT

Name of Dam CLAYSVILLE No. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF  | OBSERVATIONS  | REMARKS OR RECOMMENDATIONS   |
|--|---------------|--|
| SURFACE CRACKS   | None observed |  |
| UNUSUAL MOVEMENT OR<br>CRACKING AT OR BEYOND<br>THE TOE      | None observed |  |
| SLOUGHING OR EROSION OF<br>EMBANKMENT AND ABUTMENT<br>SLOPES |               | No problems were observed. The embankment has a good cover of well maintained grass. |

## EMBANKMENT

Name of Dam CLAYSVILLE No. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF                          | OBSERVATIONS   | REMARKS OR RECOMMENDATIONS   |
|--|--|--|
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST | <p>The horizontal alignment of the dam is good. The top of dam is level except for areas on both sides of the spillway structure. The left side is 0.7 ft. low at the spillway training wall to 0.2 ft. low at the ft. to the left of the spillway. It appears the right abutment (adjacent to the spillway) was not raised to the top of dam elevation during original construction. Immediately to the right of the spillway training wall, this abutment is 3.0 ft. low; it then slopes up to El. 1102.5 ft. approximately 25 ft. to the right of the wall.</p> | <p>The low areas should be filled/ repaired to average top of dam El. 1162.5 ft.</p> |
| RIPRAP FAILURES                                | None   |  |
| ANIMAL BURROWS/<br>RODENT HOLES                | <p>Two animal burrows/rodent holes were observed at Station 1 + 33 and 1 + 49 (the stationing using during the visual inspection is shown on the field sketch), approximately 10 ft. below the crest of the dam.</p>   | <p>These animal burrows/rodent holes should be filled.</p>                           |

## EMBANKMENT

Name of Dam CLAYSVILLE No. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF                                       | OBSERVATIONS  | REMARKS OR RECOMMENDATIONS |
|---|---|----------------------------|
| JUNCTION OF EMBANKMENT<br>AND ABUTMENT, SPILLWAY<br>AND DAM | No problems were observed except for the<br>previously mentioned low spots on the<br>right abutment.  |                            |
| ANY NOTICEABLE SEEPAGE                                      | None  |                            |
| STAFF GAGE AND RECORDER                                     | None  |                            |
| DRAINS  | Only one drain (a 4 in. terra cotta pipe)<br>along the right abutment spillway training<br>wall was installed. A small amount of<br>drainage (less than 1 g.p.m.) was flowing<br>at the time of inspection. |                            |

## OUTLET WORKS

Name of Dam: CLAYSVILLE No. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF  | OBSERVATIONS   | REMARKS OR RECOMMENDATIONS  |
|--|--|---|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | The downstream end of the 12 in. C.I.P., where the emergency drawdown exits into the stilling basin, was in fair condition.  |   |
| INTAKE STRUCTURE   | The intakes were submerged and could not be observed. The riser was filled with water and could not be examined. The portion of the riser above the water surface appeared to be in good condition except for some minor spalling of the concrete. | The spalled concrete should be repaired.  |
| OUTLET STRUCTURE   | The outlet pipe discharges into the stilling basin. No problems were observed with the stilling basin except for some deterioration and spalling of the concrete.  | The spalled and deteriorated concrete should be repaired.   |
| OUTLET CHANNEL   | The outlet discharges into the stilling basin of the spillway. Approximately 100 ft. downstream of the spillway, the channel is partially restricted and obstructed.   | It is recommended that the obstructions be removed from the channel.  |
| EMERGENCY GATE   | The intake sluice gates are kept open for water supply purposes. The valve for the emergency drawdown is at the toe of the embankment, just upstream (continued next page)   | It is recommended that the condition of the sluice gates and valves be evaluated and their operability checked in all future inspections. |



## OUTLET WORKS

Name of Dam CLAYSVILLE No. 1 DAM  
NDI # PA 00491

| VISUAL EXAMINATION OF         | OBSERVATIONS  | REMARKS OR RECOMMENDATIONS |
|-------------------------------|---|----------------------------|
| EMERGENCY GATE<br>(continued) | of the stilling basin. At this point the outlet pipe splits, with a pipe installed to the filtration plant and the outlet continuing straight in plan into the stilling basin. The owners representative did not know when the valves were last operated. |                            |
|                               |   |                            |
|                               |   |                            |
|                               |   |                            |
|                               |   |                            |

## UNGATED SPILLWAY

Name of Dam: CLAYSVILLE No. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF | OBSERVATIONS   | REMARKS OR RECOMMENDATIONS                                |
|-----------------------|--|---|
| CONCRETE WEIR         | The concrete weir was in good condition. The weir was apparently constructed approximately 1.5 ft. higher than the design drawing elevation.   |   |
| APPROACH CHANNEL      | The approach channel is formed by wing walls on both sides and the reservoir bottom. No problems in the spillway approach were observed.   |   |
| DISCHARGE CHANNEL     | The discharge channel is a rectangular concrete chute curving toward the center of the dam. Some deterioration and spalling of the concrete has occurred, especially along the top of the walls and at the joints. | The spalled and deteriorated concrete should be repaired. |
| BRIDGE AND PIERS      | Not Applicable   |   |

A-10

GATED SPILLWAY - Not Applicable

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|----------------------------|
|-----------------------|--------------|----------------------------|

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION  
EQUIPMENT

A-11

INSTRUMENTATION - None

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

| VISUAL EXAMINATION | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--------------------|--------------|----------------------------|
|--------------------|--------------|----------------------------|

MONUMENTATION/SURVEYS

OBSERVATION WELLS

WEIRS

PIEZOMETERS

OTHER

## RESERVOIR

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|----------------------------|
|-----------------------|--------------|----------------------------|

## SLOPES

The reservoirs slopes are well forested and mild. No problems were observed.

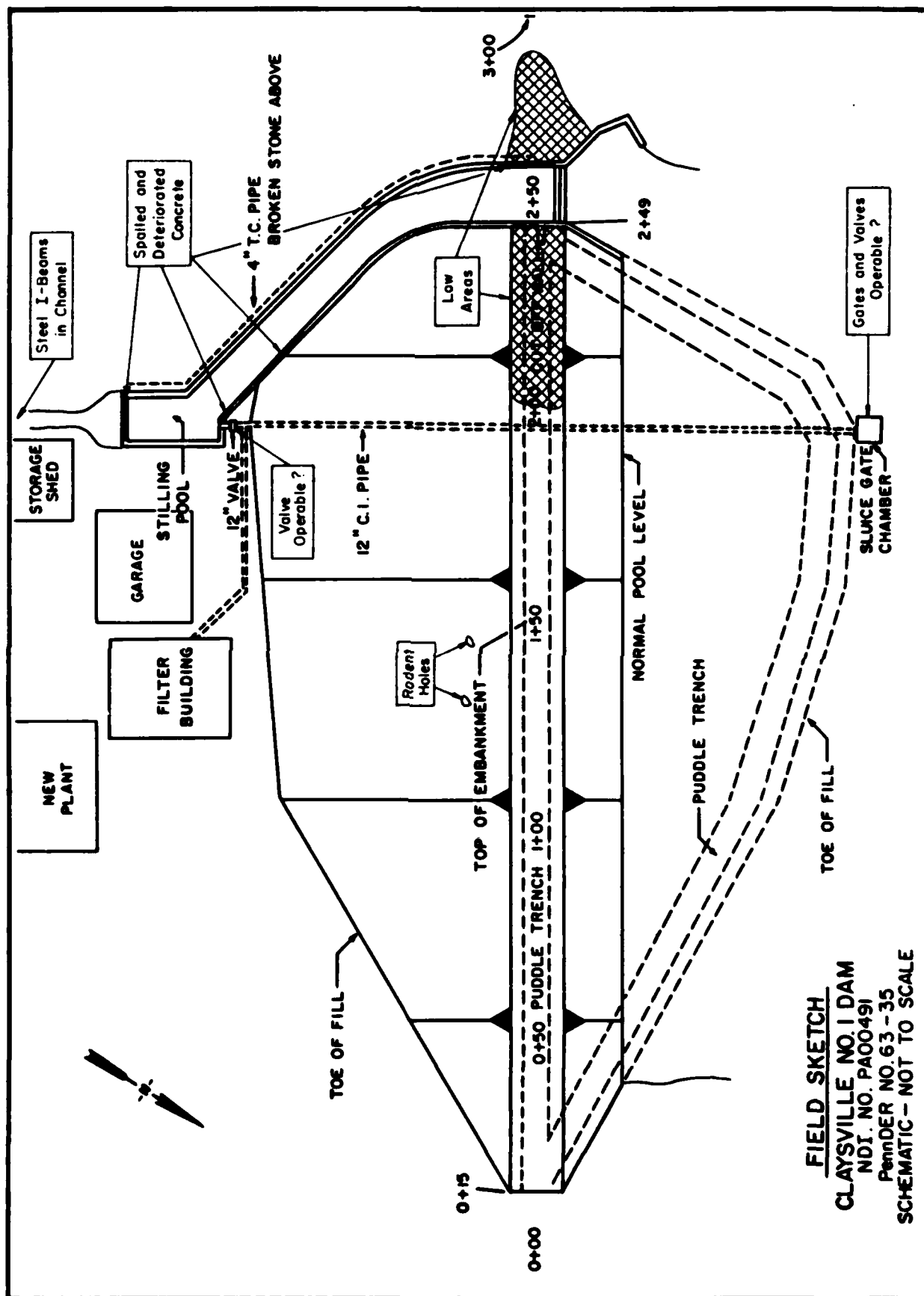
## SEDIMENTATION

It is not known to what extent the water supply storage has been decreased by sedimentation for this reservoir. The amount of available flood storage has not been significantly affected by sedimentation.

## DOWNSTREAM CHANNEL

Name of Dam: CLAYSVILLE NO. 1 DAM  
 NDI # PA 00491

| VISUAL EXAMINATION OF                         | OBSERVATIONS  | REMARKS OR RECOMMENDATIONS   |
|---|---|--|
| CONDITION<br>(OBSTRUCTIONS,<br>DEBRIS, ETC.)  | Approximately 100 ft. downstream of the stilling basin the channel is partially obstructed by a couple of steel I-beams.  | It is recommended that for good housekeeping procedures and to minimize the potential of flooding in the various storage buildings in the immediate area, the I-beams be removed from the channel. The channel should be kept free of debris and obstructions in the future. |
| SLOPES  | The channel is located along the right valley slope. This slope (where it could be observed) is predominantly shale. No problems were observed from a soil mechanics point of view. The downstream channel slope is mild (estimated 2%).  |  |
| APPROXIMATE NO.<br>OF HOMES AND<br>POPULATION | The water filtration plant is located immediately downstream of the left half of the dam. Several (four) storage facilities are also located immediately downstream of the right half of the dam. Approximately 900 ft. downstream is an elementary school and play-yard. Three residential structures are also located in the floodplain before the discharge would pass through a restrictive (approximately 4.5 ft. by 6 ft.) road (U.S. Route 40) culvert. An additional estimated 10 structures are located in the floodplain between U.S. 40 and a Baltimore and Ohio R.R. embankment and culvert. The amount of the flow that can be discharged by the R.R. culvert is also estimated to be low. |  |



FIELD SKETCH  
 CLAYSVILLE NO. 1 DAM  
 NDI. NO. PA00491  
 PENNER NO. 63-35  
 SCHEMATIC - NOT TO SCALE

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

10 February 1980

Box 280

Beaver, Pa. 15009

CLAYSVILLE No. 1 DAM

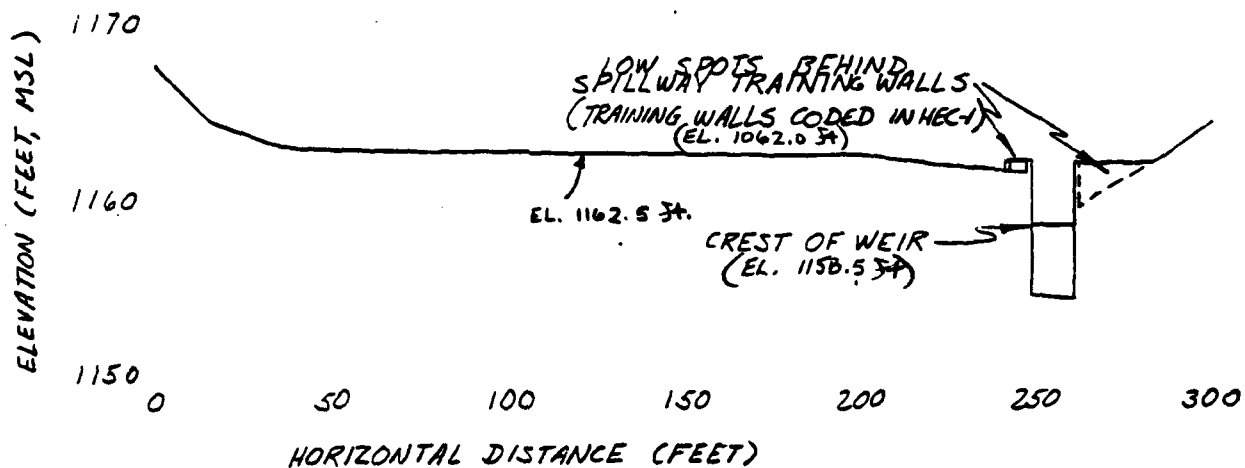
TOP OF DAM PROFILE

TYPICAL CROSS-SECTION

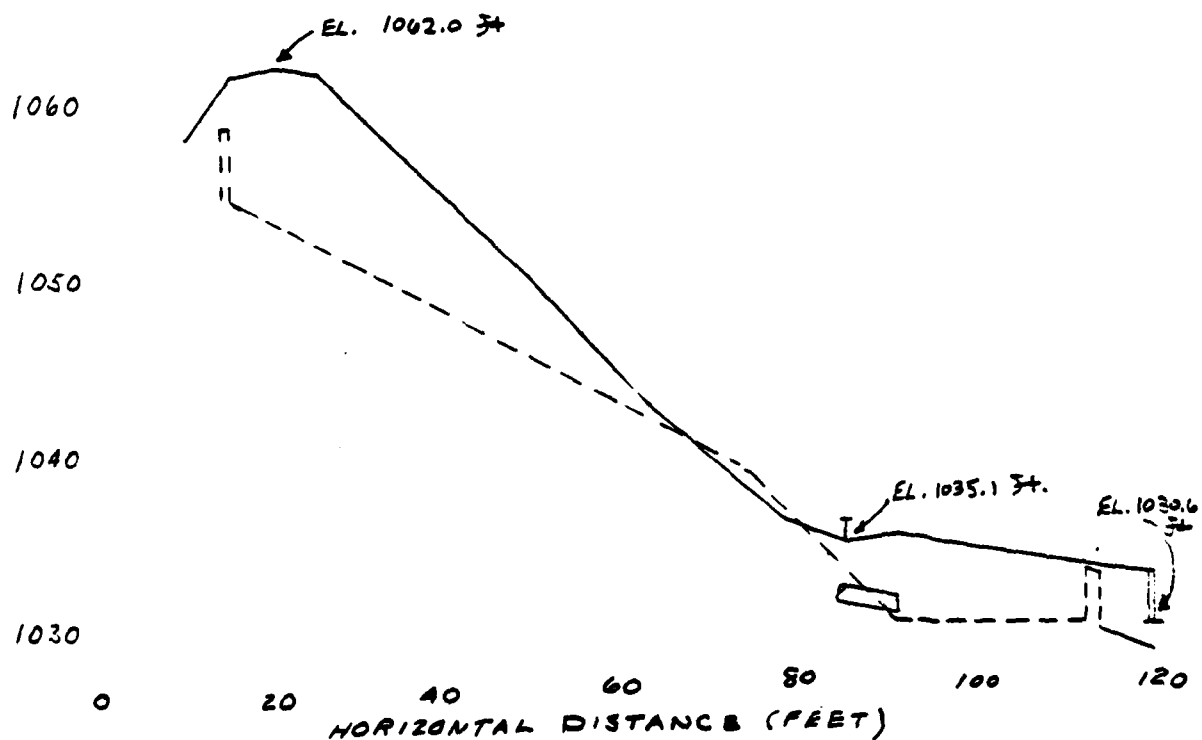
A-15

Date of Inspection: 5 December 1979

TOP OF DAM PROFILE (LOOKING DOWNSTREAM):



DAM CROSS SECTION:





**APPENDIX B**

**ENGINEERING DATA CHECK LIST**

**CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION**

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

| <u>ITEM</u>                       | <u>REMARKS</u>  |
|-----------------------------------|---|
| <b>PLAN OF DAM</b>                | See Plate 3 of this report.   |
| <b>REGIONAL VICINITY MAP</b>      | USGS 7.5 minute topographic quadrangles, Claysville and West Middletown, Pennsylvania were used to prepared the vicinity map which is enclosed in this report as the Location Plan (Plate 1).   |
| <b>CONSTRUCTION HISTORY</b>       | The dam was designed by Mr. David C. Morrow of Washington, Pennsylvania. The original design drawing (Plate 3) is dated February 1926. The dam was constructed by Thompson Construction Company of Washington, Pennsylvania. Work started immediately after issue of the permit on 28 July 1926 and was complete, except for sluice gates and valves, by 1 November 1926. |
| <b>TYPICAL SECTIONS OF DAM</b>    | See Plate 3   |
| <b>HYDROLOGIC/HYDRAULIC DATA</b>  | No information available  |
| <b>OUTLETS - PLAN</b>             | See Plate 3   |
| - DETAILS                         | See Plate 3   |
| - CONSTRAINTS                     | None  |
| - DISCHARGE RATINGS               | None available  |
| <b>RAINFALL/RESERVOIR RECORDS</b> | None available  |

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

B-2

| ITEM  | REMARKS  |
|---|--|
| DESIGN REPORTS  | None available   |
| GEOLOGY REPORTS   | No geology reports are available for the dam. See Appendix F for the regional geology.         |
| DESIGN COMPUTATIONS<br>HYDROLOGY & HYDRAULICS<br>DAM STABILITY<br>SEEPAGE STUDIES | No design computations are available.  |
| MATERIALS INVESTIGATIONS<br>BORING RECORDS<br>LABORATORY<br>FIELD                 | No information was available indicating that any type of material investigation was performed. |
| POST-CONSTRUCTION SURVEYS OF DAM  | No information available   |
| BORROW SOURCES  | No information available   |

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

B-3

| ITEM  | REMARKS   |
|---|---|
| MONITORING SYSTEMS                                    | None  |
| MODIFICATIONS   | Flashboards were installed in 1930 but were permanently removed at a later date. The water supply pipe to the filter building from the downstream toe of the embankment (and outlet pipe) was replaced when modifications to the filtration plant were constructed.                     |
| HIGH POOL RECORDS                                     | No information available  |
| POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS     | The dam was inspected by Pennder or its predecessor on the following dates: 1) 21 April 1927, 2) 29 June 1928, 3) 14 April 1931, 4) 3 April 1935, 5) 7 July 1938, 6) 7 May 1945, 7) 13 September 1961. Copies of the inspection reports are available in the Pennder file for this dam. |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | None  |
| MAINTENANCE OPERATION RECORDS                         | None available  |

Name of Dam: CLAYSVILLE No. 1 DAM  
NDI # PA 00491

B-4

| ITEM | REMARKS |
|------|---------|
|------|---------|

SPILLWAY PLAN,

SECTIONS,  
and  
DETAILS

See Plate 3

OPERATING EQUIPMENT  
PLANS & DETAILS

See Plate 3

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.28 sq.mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1158.5 ft. (25 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1162.0 ft.

(47 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1162.0 ft. (minimum elevation)

SPILLWAY:

- a. Crest Elevation: 1158.5 ft.
- b. Type Sharp crested concrete weir in rectangular concrete
- c. Width of Crest Parallel to Flow 1.0 ft. channel
- d. Length of Crest Perpendicular to Flow 12 ft.
- e. Location Spillover At right abutment of dam
- f. Number and Type of Gates None

OUTLET WORKS: Water Supply Intakes and Drawdown Facilities

- a. Type 12 in. C.I.P. installed on 12 in. thick concrete cradle
- b. Location 50 ft. left of the spillway
- c. Entrance Inverts 3-8 in. sluice gates: El. 1152.5, 1143,
- d. Exit Inverts El. 1131.08 ft. 1133.2 ft.; 12 in. C.I.P.:  
El. 1133.15 ft.
- e. Emergency Drawdown Facilities Valve at toe of slope opening  
discharge from 12 in. C.I.P.

HYDROMETEOROLOGICAL GAGES: None installed to stilling basin.

- a. Type
- b. Location
- c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown

**APPENDIX C**

**PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS**

## DETAILED PHOTOGRAPH DESCRIPTIONS

### Overall View of Dam

Top Photo - Overall View of Dam from Left Abutment  
(OV-T)

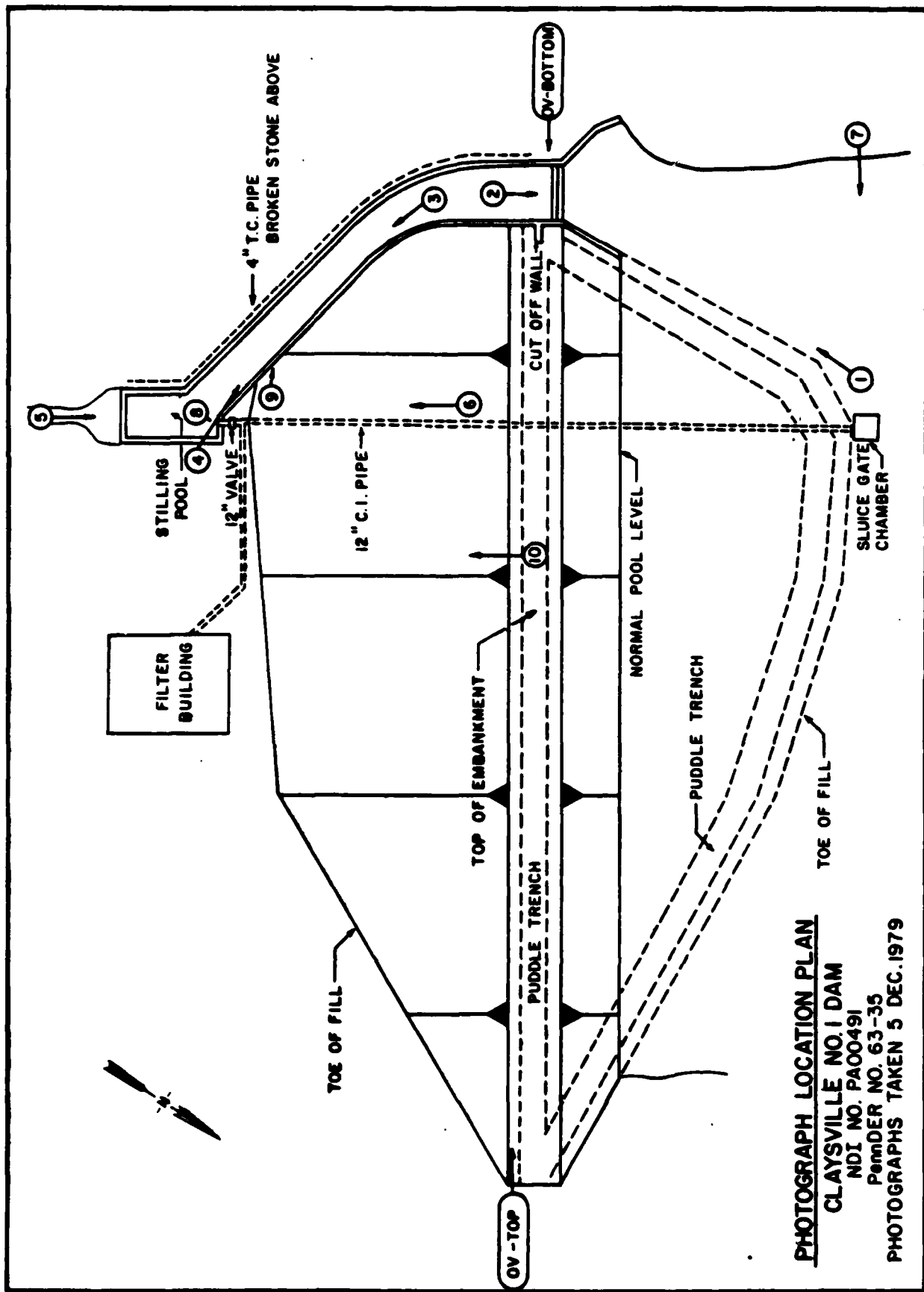
Bottom Photo - Overall View of Dam from the Right  
(OV-B) Abutment

### Photograph Location Plan

- Photo 1 - View of the Spillway Approach from the Intake Riser
- Photo 2 - View Looking Upstream at the Spillway Crest from Inside the Spillway Chute Channel
- Photo 3 - View Looking Downstream at the Spillway Chute Channel
- Photo 4 - View Looking Upstream at the Spillway Chute Channel
- Photo 5 - View Looking Upstream at the Stilling Basin
- Photo 6 - View Looking Downstream at the Downstream Channel
- Photo 7 - View of the Intake Riser from the Right Side of the Reservoir Shoreline
- Photo 8 - View of the Discharge Pipe into the Stilling Basin from the Outlet Works in the Dam
- Photo 9 - View of Some of the Spalled Concrete on the Left Training Wall of the Chute Channel
- Photo 10 - View from the Crest of the Embankment Looking Downstream at the School Located within the Downstream Channel Floodplain

Note: Photographs were taken on 5 December 1979.





# **PHOTOGRAPH LOCATION PLAN**

CLAYSVILLE NO. 1 DAM

NDI NO. PA00491

Permdr NO. 63-35

PHOTOGRAPHS TAKEN 5 DEC. 1979

## CLAYSVILLE No. 1 DAM

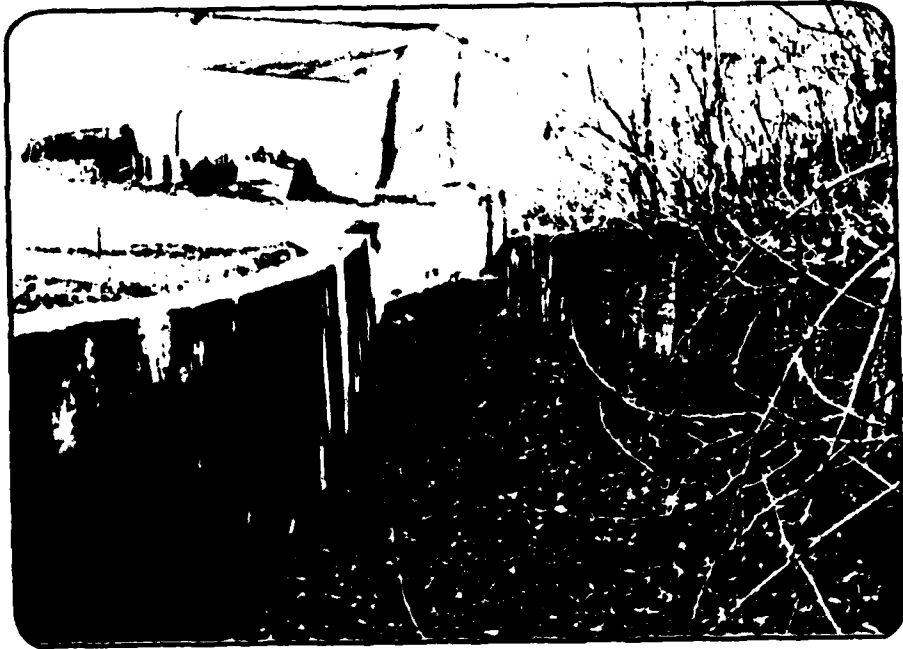


**PHOTO 1. View of the Spillway Approach from the Intake Riser**



**PHOTO 2. View Looking Upstream at the Spillway Crest from Inside the Spillway Chute Channel**

**CLAYSVILLE No. 1 DAM**



**PHOTO 3. View Looking Downstream at the Spillway Chute Channel**



**PHOTO 4. View Looking Upstream at the Spillway Chute Channel**

# **CLAYSVILLE No. 1 DAM**



**PHOTO 5. View Looking Upstream at the Stilling Basin**



**PHOTO 6. View Looking Downstream at the Downstream Channel**

**CLAYSVILLE No. 1 DAM**



**PHOTO 7. View of the Intake Riser from the Right Side of the Reservoir Shoreline**



**PHOTO 8. View of the Discharge Pipe into the Stilling Basin from the Outlet Works in the Dam**

## CLAYSVILLE No. 1 DAM



**PHOTO 9. View of Some of the Spalled Concrete on the Left Training Wall of the Chute Channel**



**PHOTO 10. View from the Crest of the Embankment Looking Downstream at the School Located Within the Downstream Channel Floodplain**

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280

Beaver, Pa. 15009

Subject \_\_\_\_\_ S.O. No. \_\_\_\_\_

*Claysville No. 1 - Hydrologic* Sheet No. \_\_\_\_\_ of \_\_\_\_\_

*and Hydraulic Computations* Drawing No. \_\_\_\_\_

Computed by \_\_\_\_\_ Checked by \_\_\_\_\_ Date \_\_\_\_\_

## Table of Contents

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| Drainage Area _____                               | 2           |
| Surface Area - Elevation _____                    | 2           |
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## PREFACE

### HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

# HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: CLAYSVILLE No. 1 DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.2 INCHES/24 HOURS<sup>(1)</sup>

| STATION  | 1                    | 2 | 3 | 4 | 5 |
|--|----------------------|---|---|---|---|
| Station Description                                    | CLAYSVILLE No. 1 DAM |   |   |   |   |
| Drainage Area (square miles)                           | 0.28                 |   |   |   |   |
| Cumulative Drainage Area (square miles)                | 0.28                 |   |   |   |   |
| Adjustment of PMP for Drainage Area (%) <sup>(2)</sup> | Zone 7               |   |   |   |   |
| 6 Hours  | 102                  |   |   |   |   |
| 12 Hours   | 120                  |   |   |   |   |
| 24 Hours   | 130                  |   |   |   |   |
| 48 Hours   | 140                  |   |   |   |   |
| 72 Hours   | -                    |   |   |   |   |
| Snyder Hydrograph Parameters                           |                      |   |   |   |   |
| Zone <sup>(3)</sup>                                    | 28B                  |   |   |   |   |
| $C_p/C_t$ <sup>(4)</sup>                               | .57/1.7              |   |   |   |   |
| L (miles) <sup>(5)</sup>                               | 0.93                 |   |   |   |   |
| $L_{ca}$ (miles) <sup>(5)</sup>                        | 0.39                 |   |   |   |   |
| $t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)             | 1.25                 |   |   |   |   |
| Spillway Data  |                      |   |   |   |   |
| Crest Length (ft)                                      | 12                   |   |   |   |   |
| Freeboard (ft)   | 3.5                  |   |   |   |   |
| Discharge Coefficient                                  | 3.09                 |   |   |   |   |
| Exponent   | 1.5                  |   |   |   |   |

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients ( $C_p$  and  $C_t$ ).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

$L_{ca}$  = Length of water course from outlet to point opposite the centroid of drainage area.

MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject CLAYSVILLE DAM #1 S.O. No. 13547-00-17A-0  
DRAINAGE AREA, SURFACE AREAS, Sheet No. 2 of 9  
SNYDERS UH PARAMETERS Drawing No. \_\_\_\_\_  
Computed by JAQ Checked by WLS Date FEB 5, 1980

### DRAINAGE AREA

DRAINAGE AREA ABOVE DAM (MEASURED ON  
CLAYSVILLE AND WEST MIDDLETOWN, PA. QUADS)  
= 1.95 SQ. W. = 0.28 SQ. MI.

DISTANCE FROM CENTROID TO DAM (MEASURED ALONG  
FLOWLINE) = 2035 FT = 0.39 MILE

LONGEST FLOWLINE TO DAM (MEASURED FROM NORTH  
END OF WATERSHED) = 4900 FT = 0.93 MILE.

### SURFACE AREAS

NORMAL WATER : 4.92 ACRES (ELEV 1158.5)  
① ELEV 1160 : 6.43 ACRES  
② ELEV 1180 : 14.08 ACRES  
③ ELEV 1143, assume area = 0 acres

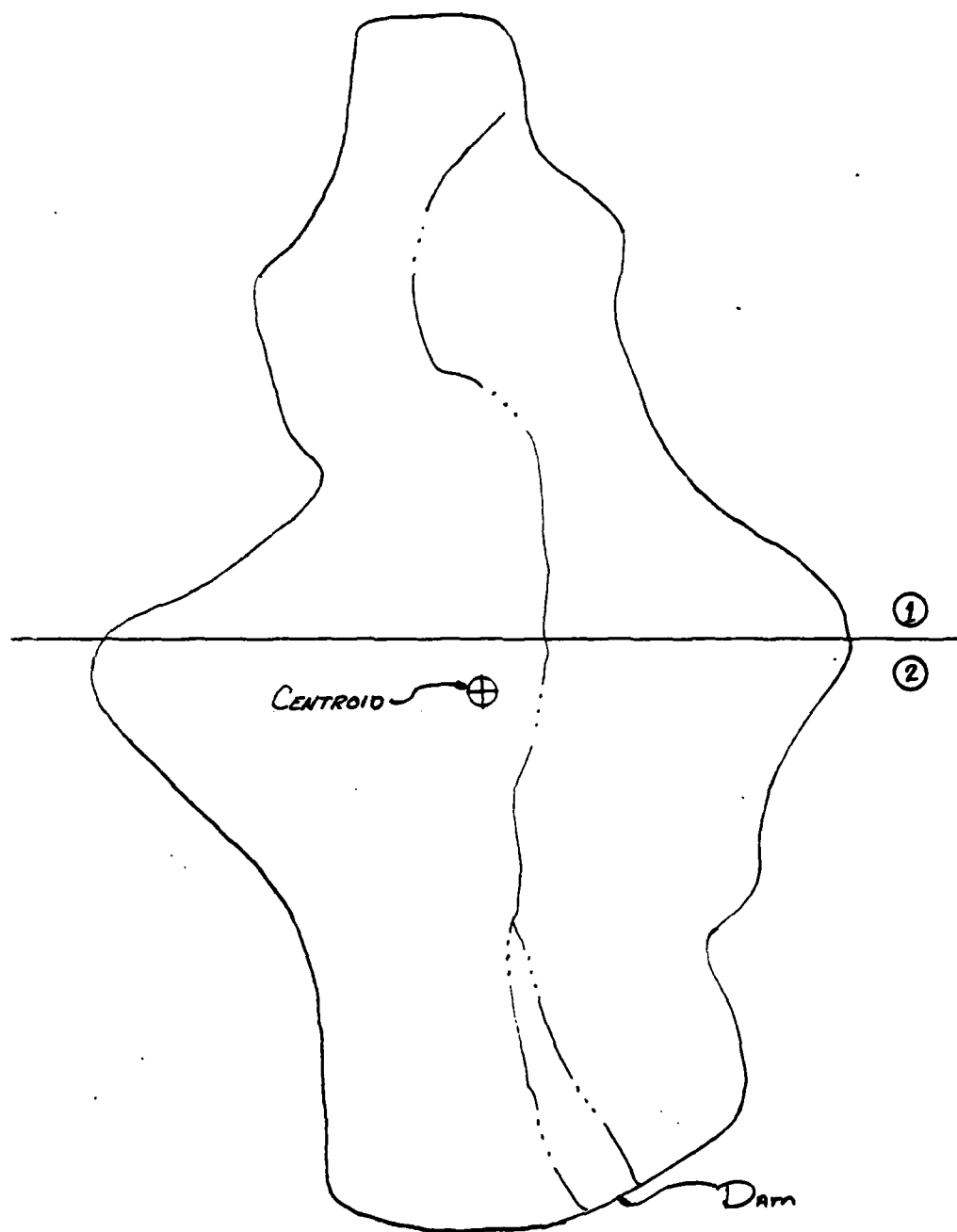
### SNYDER'S UNIT HYDROGRAPH PARAMETERS (FROM MATERIAL PROVIDED BY) BALTIMORE DISTRICT, COE

$$L = 0.93 \text{ mile}$$

$$L_{ca} = 0.39 \text{ mile}$$

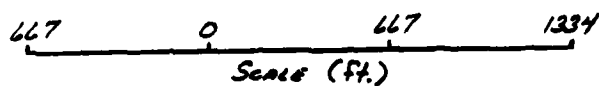
1. FROM INCL. 2, DAM IS IN ZONE 28 B
2. FROM INCL. 3,  $C_p = 0.57$
3. FROM PLATE P,  $C_T = 1.7$

$$\begin{aligned} t_p &= C_T (L \cdot L_{ca})^{0.3} \\ &= 1.7 (0.93 \times 0.39)^{0.3} \\ &= 1.25 \text{ hr} \end{aligned}$$



QUADS:

1. WEST MIDDLETOWN
2. CLAYSVILLE



CLAYSVILLE DAM No. 1  
DRAINAGE AREA MAP

MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject CLAYSVILLE DAM #1

TOP OF DAM PROFILE;

DAM CROSS SECTION

Computed by JAQ

Checked by \_\_\_\_\_

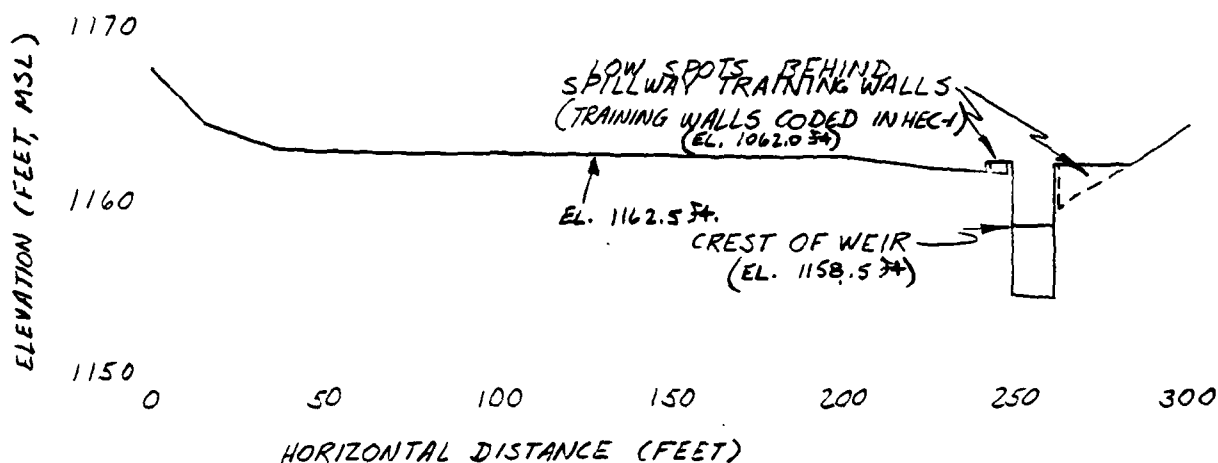
S.O. No. 13547-30-ARA-0

Sheet No. 4 of 9

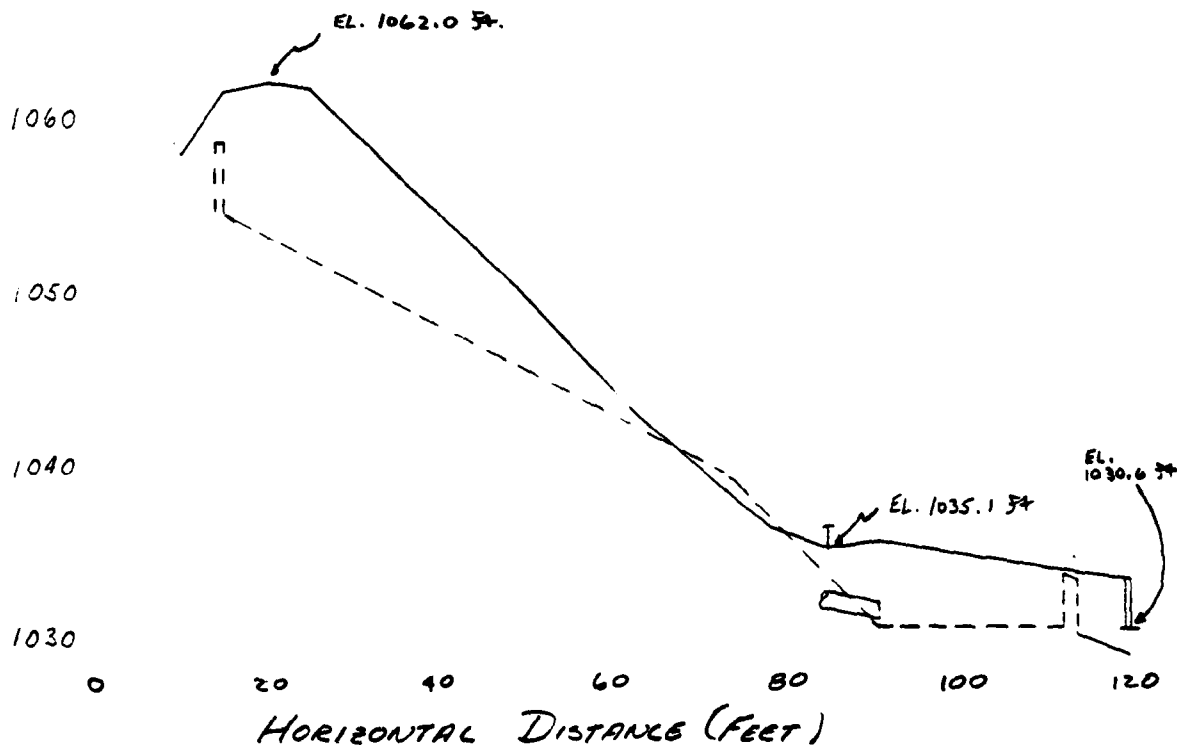
Drawing No. \_\_\_\_\_

Date FEB 10, 1980

TOP OF DAM PROFILE (LOOKING DOWNSTREAM):



DAM CROSS SECTION:



FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 MSJ UPDATE 04 JUN 79

A1 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
 A2 HYDROLOGIC AND HYDRAULIC ANALYSES OF CLAYSVILLE 1 DAM  
 A3 PROBABLE MAXIMUM FLOOD, UNIT GRAPH BY SNYDER'S METHOD

0

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K1 INTERSECTION DEVELOPMENT  
 M 1 20 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990

K1 ROUTING FOR CLAYSVILLE 1 DAM  
 V1 1 1.25 .57  
 SA 0 4.92 6.43 14.08  
 SE 1153 1159.5 1160 1180  
 S1 1150.5 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826 2827 2828 2829 2830 2831 2832 2833 2834 2835 2836 2837 2838 2839 2840 2841 2842 2843 2844 2845 2846 2847 2848 2849 2850 2851 2852 2853 2854 2855 2856 2857 2858 2859 2860 2861 2862 2863 2864 2865 2866 2867 2868 2869 2870 2871 2872 2873 2874 2875 2876 2877 2878 2879 2880 2881 2882 2883 2884 2885 2886 2887 2888 2889 2890 2891 2892 2893 2894 2895 2896 2897 2898 2899 2900 2901 2902 2903 2904 2905 2906 2907 2908 2909 2910 2911 2912 2913 2914 2915 2916 2917 2918 2919 2920 2921 2922 2923 2924 2925 2926 2927 2928 2929 2930 2931 2932 2933 2934 2935 2936 2937 2938 2939 2940 2941 2942 2943 2944 2945 2946 2947 2948 2949 2950 2951 2952 2953 2954 2955 2956 2957 2958 2959 2960 2961 2962 2963 2964 2965 2966 2967 2968 2969 2970 2971 2972 2973 2974 2975 2976 2977 2978 2979 2980 2981 2982 2983 2984 2985 2986 2987 2988 2989 2990 2991 2992 2993 2994 2995 2996 2997 2998 2999 3000 3001 3002 3003 3004 3005 3006 3007 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3018 3019 3020 3021 3022 3023 3024 3025 3026 3027 3028 3029 3030 3031 3032 3033 3034 3035 3036 3037 3038 3039 3040 3041 3042 3043 3044 3045 3046 3047 3048 3049 3050 3051 3052 3053 3054 3055 3056 3057 3058 3059 3060 3061 3062 3063 3064 3065 3066 3067 3068 3069 3070 3071 3072 3073 3074 3075 3076 3077 3078 3079 3080 3081 3082 3083 3084 3085 3086 3087 3088 3089 3090 3091 3092 3093 3094 3095 3096 3097 3098 3099 3100 3101 3102 3103 3104 3105 3106 3107 3108 3109 3110 3111 3112 3113 3114 3115 3116 3117 3118 3119 3120 3121 3122 3123 3124 3125 3126 3127 3128 3129 3130 3131 3132 3133 3134 3135 3136 3137 3138 3139 3140 3141 3142 3143 3144 3145 3146 3147 3148 3149 3150 3151 3152 3153 3154 3155 3156 3157 3158 3159 3160 3161 3162 3163 3164 3165 3166 3167 3168 3169 3170 3171 3172 3173 3174 3175 3176 3177 3178 3179 3180 3181 3182 3183 3184 3185 3186 3187 3188 3189 3190 3191 3192 3193 3194 3195 3196 3197 3198 3199 3200 3201 3202 3203 3204 3205 3206 3207 3208 3209 3210 3211 3212 3213 3214 3215 3216 3217 3218 3219 3220 3221 3222 3223 3224 3225 3226 3227 3228 3229 3230 3231 3232 3233 3234 3235 3236 3237 3238 3239 3240 3241 3242 3243 3244 3245 3246 3247 3248 3249 3250 3251 3252 3253 3254 3255 3256 3257 3258 3259 3260 3261 3262 3263 3264 3265 3266 3267 3268 3269 3270 3271 3272 3273 3274 3275 3276 3277 3278 3279 3280 3281 3282 3283 3284 3285 3286 3287 3288 3289 3290 3291 3292 3293 3294 3295 3296 3297 329

SUN DATE 03/24/80  
TIME 14.34

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
GEOLOGIC AND HYDRAULIC ANALYSES OF CLAYVILLE 1 DAM  
POSSIBLE MINIMUM FLOOD, UNIT 6000 BY HYDRAULIC METHOD

| JOB SPECIFICATION |     |      |      |     |      |       |      |      |       |
|-------------------|-----|------|------|-----|------|-------|------|------|-------|
| NQ                | NMR | NMIN | IDAY | IHR | IWIN | NEIRC | IPLT | IPRT | NSTAN |
| 000               | 0   | 10   | 0    | 0   | 0    | 0     | 0    | -4   | 0     |

**MULTI-PLAN ANALYSES TO BE PERFORMED**

**NPLAN=1 NATIO=4 LATIO=1**

### SUB-AREA RUNOFF COMPUTATION

## TECHNOLOGY DEVELOPMENT

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRI | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 1     | 0     | 0     | 0     | 0    | 0    | 1     | 0      | 0     |

**HYDROLYZABLE**

| NAME | LANG | TAREA | SNAP | TRSDA | TRSPC | RATIO | ISMON | ISAME | LOCAL |
|------|------|-------|------|-------|-------|-------|-------|-------|-------|
| 1    | 1    | 0-24  | 0-0  | 0-24  | 0-0   | 0-0   | 0     | 1     | 0     |

## PRECIP DATA

| SPFE | PMS   | 86     | 812   | 824    | 848    | 872 | 896 |
|------|-------|--------|-------|--------|--------|-----|-----|
| 0    | 24.38 | 149.00 | 20.00 | 130.00 | 116.00 | 0   | 0   |
| 0    | 0     | 0      | 0     | 0      | 0      | 0   | 0   |

### LOSS DATA

|  | LEOPT | STGRK | DATKR | RTIOL | ERRIN | STNKS | RTIOK | STATL | CNSTL | ALSMX | RTIMP |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|  | 0     | 0-0   | 0-0   | 1-00  | 0-0   | 0-0   | 1-00  | 1-00  | 0-05  | 0-0   | 0-0   |

## UNIT HYDROGRAPH DATA

CP# 1028 CP=0.97 NTA= 0

## RECESSION DATA

STATION= -1.50 ORCSN= -0.05 RIID= 2.00  
 RECEIVING DATA

## UNIT HYDROGRAPH 49 END-OF-PERIOD COORDINATES. LAGS 1.25 H

|     | UNIT PRODUCTION | END OF YEAR | QUANTITIES | TEMP. | 1967 | 1968 | 1969 | 1970 | 1971 |
|-----|-----------------|-------------|------------|-------|------|------|------|------|------|
| 6.  | 16              | 21          | 43         | 59    | 72   | 80   | 82   | 79   | 71   |
| 3.  | 36              | 49          | 44         | 39    | 34   | 30   | 27   | 24   | 21   |
| 17. | 15              | 13          | 12         | 10    | 9    | 8    | 7    | 6    | 5    |
| 6.  | 5               | 4           | 3          | 3     | 3    | 3    | 2    | 2    | 2    |

2.  
1.  
1.  
1.  
1.  
1.  
1.  
1.

| QUD | MAIN     | EXCS   | LUSS  | LUMP    |
|-----|----------|--------|-------|---------|
| SUM | 27.10    | 24.68  | 2.42  | 26793.  |
|     | 1 688.14 | 627.14 | 61.11 | 758.691 |

## HYDROGRAPH ROUTING

## ROUTING FOR CLAYSVILLE 1 DAM

| ISTAO | ICOMP | IECON | ITAPE | JPLT | JPRI | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 3     | 1     | 0     | 0     | 3    | 0    | 1     | 0      | 0     |

| CLASS | CROSS | AVG | LOS | LSAME | LOPT | IPNO | LSIA |
|-------|-------|-----|-----|-------|------|------|------|
| 0.0   | 0.0   | 0.0 | 1   |       | 0    | 0    | 0    |

| NSYPS | NSIDL | LAG | ANSMK | X  | TSK | STORA | ISPRAT |
|-------|-------|-----|-------|----|-----|-------|--------|
| 1     | 1     | 1   | 1     | 1  | 1   | 1     | 1      |
| 2     | 2     | 2   | 2     | 2  | 2   | 2     | 2      |
| 3     | 3     | 3   | 3     | 3  | 3   | 3     | 3      |
| 4     | 4     | 4   | 4     | 4  | 4   | 4     | 4      |
| 5     | 5     | 5   | 5     | 5  | 5   | 5     | 5      |
| 6     | 6     | 6   | 6     | 6  | 6   | 6     | 6      |
| 7     | 7     | 7   | 7     | 7  | 7   | 7     | 7      |
| 8     | 8     | 8   | 8     | 8  | 8   | 8     | 8      |
| 9     | 9     | 9   | 9     | 9  | 9   | 9     | 9      |
| 10    | 10    | 10  | 10    | 10 | 10  | 10    | 10     |
| 11    | 11    | 11  | 11    | 11 | 11  | 11    | 11     |
| 12    | 12    | 12  | 12    | 12 | 12  | 12    | 12     |
| 13    | 13    | 13  | 13    | 13 | 13  | 13    | 13     |
| 14    | 14    | 14  | 14    | 14 | 14  | 14    | 14     |
| 15    | 15    | 15  | 15    | 15 | 15  | 15    | 15     |
| 16    | 16    | 16  | 16    | 16 | 16  | 16    | 16     |
| 17    | 17    | 17  | 17    | 17 | 17  | 17    | 17     |
| 18    | 18    | 18  | 18    | 18 | 18  | 18    | 18     |
| 19    | 19    | 19  | 19    | 19 | 19  | 19    | 19     |
| 20    | 20    | 20  | 20    | 20 | 20  | 20    | 20     |
| 21    | 21    | 21  | 21    | 21 | 21  | 21    | 21     |
| 22    | 22    | 22  | 22    | 22 | 22  | 22    | 22     |
| 23    | 23    | 23  | 23    | 23 | 23  | 23    | 23     |
| 24    | 24    | 24  | 24    | 24 | 24  | 24    | 24     |
| 25    | 25    | 25  | 25    | 25 | 25  | 25    | 25     |
| 26    | 26    | 26  | 26    | 26 | 26  | 26    | 26     |
| 27    | 27    | 27  | 27    | 27 | 27  | 27    | 27     |
| 28    | 28    | 28  | 28    | 28 | 28  | 28    | 28     |
| 29    | 29    | 29  | 29    | 29 | 29  | 29    | 29     |
| 30    | 30    | 30  | 30    | 30 | 30  | 30    | 30     |
| 31    | 31    | 31  | 31    | 31 | 31  | 31    | 31     |
| 32    | 32    | 32  | 32    | 32 | 32  | 32    | 32     |
| 33    | 33    | 33  | 33    | 33 | 33  | 33    | 33     |
| 34    | 34    | 34  | 34    | 34 | 34  | 34    | 34     |
| 35    | 35    | 35  | 35    | 35 | 35  | 35    | 35     |
| 36    | 36    | 36  | 36    | 36 | 36  | 36    | 36     |
| 37    | 37    | 37  | 37    | 37 | 37  | 37    | 37     |
| 38    | 38    | 38  | 38    | 38 | 38  | 38    | 38     |
| 39    | 39    | 39  | 39    | 39 | 39  | 39    | 39     |
| 40    | 40    | 40  | 40    | 40 | 40  | 40    | 40     |
| 41    | 41    | 41  | 41    | 41 | 41  | 41    | 41     |
| 42    | 42    | 42  | 42    | 42 | 42  | 42    | 42     |
| 43    | 43    | 43  | 43    | 43 | 43  | 43    | 43     |
| 44    | 44    | 44  | 44    | 44 | 44  | 44    | 44     |
| 45    | 45    | 45  | 45    | 45 | 45  | 45    | 45     |
| 46    | 46    | 46  | 46    | 46 | 46  | 46    | 46     |
| 47    | 47    | 47  | 47    | 47 | 47  | 47    | 47     |
| 48    | 48    | 48  | 48    | 48 | 48  | 48    | 48     |
| 49    | 49    | 49  | 49    | 49 | 49  | 49    | 49     |
| 50    | 50    | 50  | 50    | 50 | 50  | 50    | 50     |
| 51    | 51    | 51  | 51    | 51 | 51  | 51    | 51     |
| 52    | 52    | 52  | 52    | 52 | 52  | 52    | 52     |
| 53    | 53    | 53  | 53    | 53 | 53  | 53    | 53     |
| 54    | 54    | 54  | 54    | 54 | 54  | 54    | 54     |
| 55    | 55    | 55  | 55    | 55 | 55  | 55    | 55     |
| 56    | 56    | 56  | 56    | 56 | 56  | 56    | 56     |
| 57    | 57    | 57  | 57    | 57 | 57  | 57    | 57     |
| 58    | 58    | 58  | 58    |    |     |       |        |

|               |    |     |     |      |
|---------------|----|-----|-----|------|
| SURFACE AREA= | 0. | 5.  | 6.  | 19.  |
| CAPACITY=     | 0. | 25. | 34. | 234. |

| EXPLANATION | DATE  | CHRG | SPRID | DEBIT  | CREDIT | BALANCE |
|-------------|-------|------|-------|--------|--------|---------|
|             | 11-11 |      |       | 1150.3 | 12.0   | 3.1     |

**DAN DATA**

[illegible]

PEAK OUTFLOW IS 839. AT TIME 40.83 HOURS

PEAK OUTFLOW IS 629. AT TIME 41.00 HOURS

PEAK OUTFLOW IS 407, AT TIME 01.17 HOURS. FROM 11.16

PEAK OUTFLOW IS 175. AT TIME 41.67 HOURS

~~SECRET~~ 7 OF 8



PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

| OPERATION | STATION | AREA | PLAN | RATIO 1 | RATIO 2 | RATIO 3 | RATIO 4 |
|-----------|---------|------|------|---------|---------|---------|---------|
|           |         |      |      | 1.00    | 0.75    | 0.50    | 0.25    |

|               |   |      |   |      |      |      |      |
|---------------|---|------|---|------|------|------|------|
| HYDROGRAPH AT | 1 | 0.28 | 1 | 0.27 | 0.35 | 0.25 | 2121 |
|---------------|---|------|---|------|------|------|------|

|           |   |      |   |         |         |         |        |
|-----------|---|------|---|---------|---------|---------|--------|
| ROUTED TO | 2 | 0.73 | 6 | 23.7734 | 17.8114 | 11.5214 | 4.9616 |
|-----------|---|------|---|---------|---------|---------|--------|

7

1

**APPENDIX E**

**PLATES**

## CONTENTS

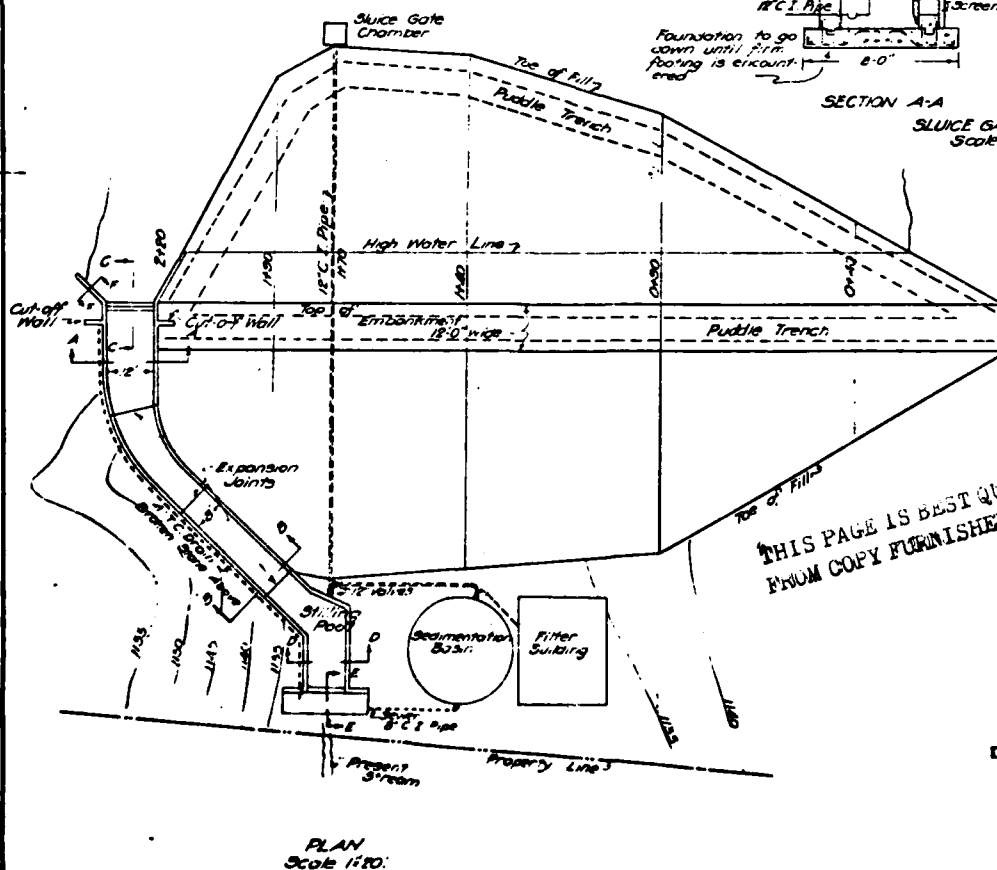
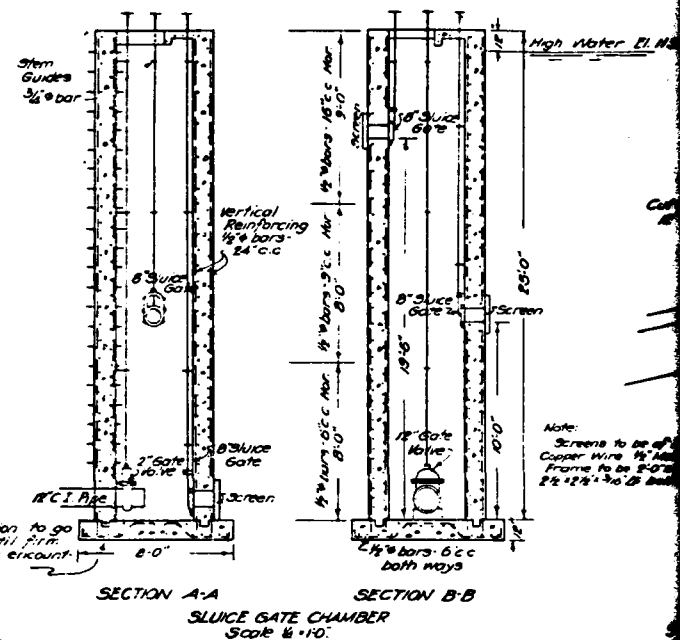
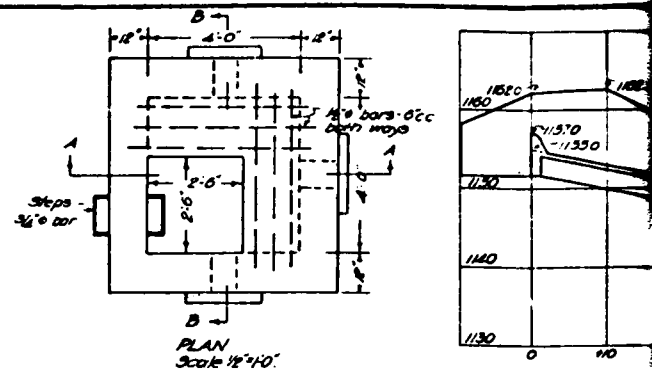
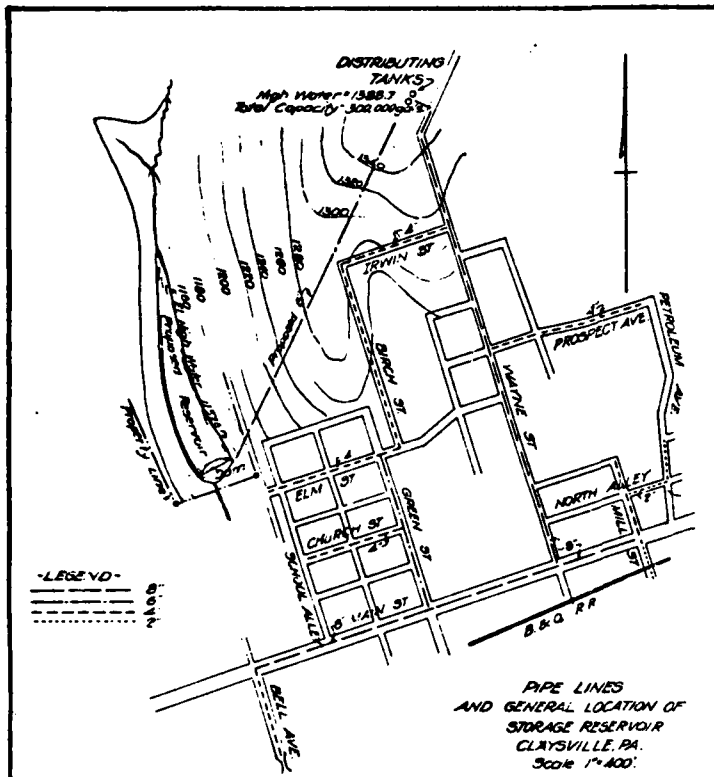
Plate 1 - Location Plan

Plate 2 - Watershed Map

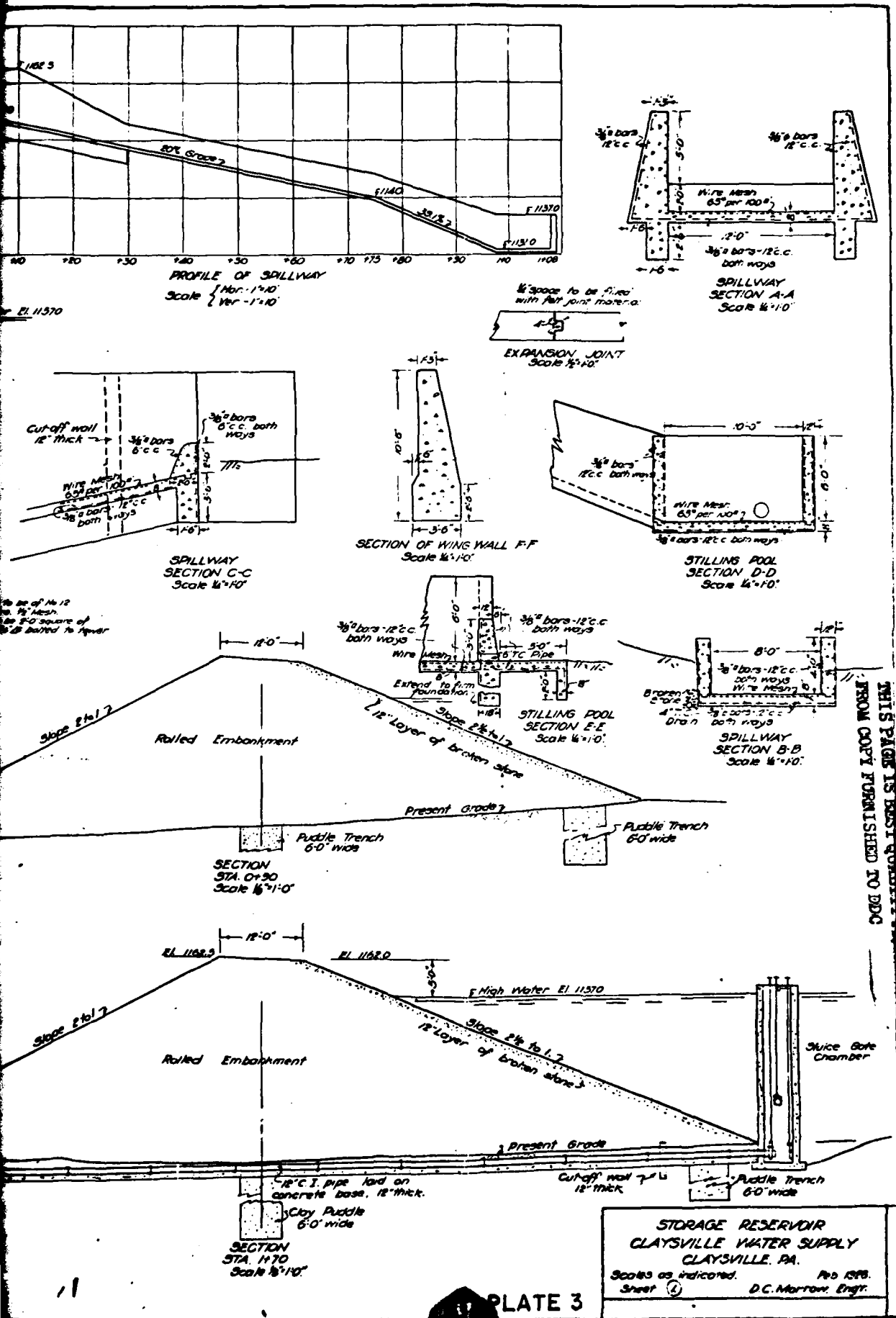
Plate 3 - Original Design Drawing (dated February 1926)







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APPENDIX F

REGIONAL GEOLOGY

CLAYSVILLE No. 1 DAM  
NDI No. PA 00491, PennDER No. 63-35

REGIONAL GEOLOGY

The dam and reservoir are located in an unglaciated area of the Appalachian Plateaus Physiographic Province. Bedrock units below the dam are members of the Washington Formation, Dunkard Group, Pennsylvanian System. These units are typically cyclic sequences of sandstone, shale, limestone, and coal. The dam is located approximately 1.5 miles east of the axis of the Claysville Anticline. The bedrock units are typically dipping 60 to 80 feet per mile in a southerly direction.

Coals located below the dam include the Washington coal (approximately 28 inches), Waynesburg coal (approximately 14 inches), Sewickley coal (inferred), Redstone coal (inferred), and the Pittsburgh coal (approximately 60 inches). The Pittsburgh coal mineral rights are indicated as being owned by the Valley Camp Coal Company - Mine No. 3. The Pittsburgh coal is located approximately 535 feet (Elevation 625 feet) below the top of the dam.

References:

1. "Bituminous Coal Resources in Western Pennsylvania," compiled by Mark A. Sholes and Viktoras W. Skerna, Pennsylvania Topographic and Geologic Survey Mineral Resources Report No. 68, 1974.
2. "Coal-Bearing Upper Pennsylvania and Lower Permian Rocks, Washington Area, Pennsylvania," by Henry L. Berryhill, Jr. and others, United States Geological Survey Professional Paper No. 621, 1971.
3. "Engineering Characteristics of the Rocks of Pennsylvania," by William G. McGlade and others, Pennsylvania Geological Survey Bulletin EG 1, 1972.
4. "Greater Pittsburgh Region Geologic Map," compiled by W.R. Wagner and others, Pennsylvania Topographic and Geologic Survey Map No. 42, 1975.
5. "Greater Pittsburgh Region Maps of Mined-Out Areas and Thickness of Rock Over the Pittsburgh Coal," compiled by S.E. Cortis and others, Pennsylvania Topographic and Geologic Survey Map No. 45, 1975.
6. "Greater Pittsburgh Region Structure Contour Map," compiled by W.R. Wagner and others, Pennsylvania Topographic and Geologic Survey Map No. 43, 1975.

7. "Greater Pittsburgh Region - Thickness of Rock Over the Upper Freeport Coal," compiled by J.L. Craft and others, Pennsylvania Topographic and Geologic Survey Map No. 49, 1976.



# GEOLOGY MAP LEGEND

## GROUP FORMATION

## DESCRIPTION

|                  |            |     |   |
|------------------|------------|-----|---|
| Alluvium         |            | Ol  | Sand, gravel, clay.   |
| Terrace deposits |            |     | Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.  |
| DUNKARD          | Greene     |     | Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.  |
|                  | Washington | Pw  | Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.  |
|                  | Waynesburg |     | Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.   |
| MONONGAHELA      |            | Pm  | Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.   |
| P:<br>CONEMAUGH  | Casselman  | Pcc | Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.  |
|                  | Ames       |     |   |
|                  | Glenshaw   | Pcg | Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.   |
| ALLEGHENY        | Vanport    | Pa  | Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals. |
|                  |            | Pa  |   |
| POTTSVILLE       |            | Pp  | Sandstone and shale; contains some conglomerate and locally mineable coal.  |
| Mauch Chunk      |            | Mmc | Red and green shale with some sandstone; contains Wymys Gap and Loyalhanna limestones.  |
| Pocono           |            | Mp  | Sandstone and shale with Burgoon sandstone at top.  |